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(71)Applicant : TOYOTA MOTOR CORP

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(72)Inventor : NAGAO TOMOKI
 IYODA NORIBUMI

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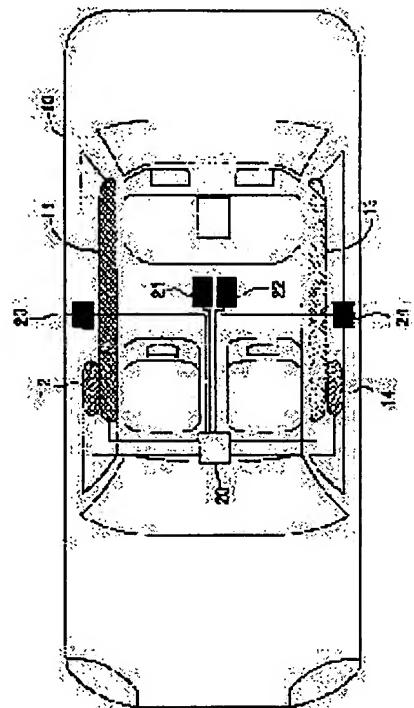
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(54) CONTROL DEVICE FOR OCCUPANT PROTECTIVE DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a control device for an occupant protective device capable of properly operating the occupant protective device in a side impact and in generation of a rollover.

SOLUTION: An electric control device 20 is provided with a right side impact sensor 23 and a left side impact sensor 24 for detecting a side collision from lateral acceleration generated in a center pillar of a vehicle and a rollover decision means for deciding whether the rollover is generated or not based on outputs of a roll rate sensor 21 and a lateral acceleration sensor 22. When the side impact is detected, either one of curtain air bags 11 and 13 on the side impact side and either one of side air bags 12 and 14 on the side impact side are unfolded, and the decision of generation of the rollover is invalidated till prescribed time elapses from the detection point of time. As a result, when the side impact is detected and the rollover is not generated, unfolding of either one of the left and right curtain air bags 11 and 13 which are not on the side impact side is avoided.



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CLAIMS

[Claim(s)]

[Claim 1] The control unit of occupant crash protection characterized by providing the following A collision judging means to judge whether it was carried in the vehicles equipped with occupant crash protection, and the collision occurred on the aforementioned vehicles It is the rollover judging nullification means which repeals a judgment that the aforementioned rollover occurs between predetermined times after being judged with being the control unit of the occupant crash protection which operates the aforementioned occupant crash protection when judged with the aforementioned rollover occurring at least including a rollover judging means to judge whether a rollover occurs or not, on the aforementioned vehicles, and the aforementioned collision having occurred.

[Claim 2] It is the control unit of the occupant crash protection constituted so that are the control unit of occupant crash protection according to claim 1, the aforementioned occupant crash protection consists of the 1st occupant crash protection and 2nd occupant crash protection, it operated the 1st occupant crash protection of the above when judged with the collision having occurred by the aforementioned collision judging means, and the 2nd occupant crash protection of the above might be operated, when judged with the aforementioned rollover occurring.

[Claim 3] It is the control unit of the occupant crash protection which is a side ***** means to judge whether it is the control unit of occupant crash protection according to claim 1 or 2, and side ** generated the aforementioned collision judging means on the aforementioned vehicles.

[Claim 4] It is the control unit of the occupant crash protection which is a front ***** means to judge whether it is the control unit of occupant crash protection according to claim 1 or 2, and front ** generated the aforementioned collision judging means on the aforementioned vehicles.

[Claim 5] It is the control unit of the occupant crash protection which is a back ***** means to judge whether it is the control unit of occupant crash protection according to claim 1 or 2, and back ** generated the aforementioned collision judging means on the aforementioned vehicles.

[Claim 6] It is the control unit of the occupant crash protection constituted so that it might be the control unit of occupant crash protection given in any 1 term of a claim 1 or a claim 5 and might judge with a rollover generating the aforementioned rollover judging means when the point which becomes settled with the actual longitudinal direction acceleration of actual roll REITO of the aforementioned vehicles and these vehicles crosses the threshold level line which specifies the relation between roll REITO and longitudinal direction acceleration.

[Claim 7] It is the control unit of occupant crash protection given in any 1 term of a claim 1 or a claim 5. the aforementioned rollover judging means The point which becomes settled with the actual longitudinal direction acceleration of actual roll REITO of the aforementioned vehicles and these vehicles crosses the threshold level line which specifies the relation between roll REITO and longitudinal direction acceleration. And the control unit of the occupant crash protection constituted so that it might judge with the aforementioned rollover occurring when the point which becomes settled by the actual roll rate of these vehicles and the actual roll angle of these vehicles is in a rollover judging permitted region.

[Claim 8] In the control unit of occupant crash protection according to claim 6 or 7 the aforementioned rollover judging means It is constituted so that it may judge with a rollover occurring when the point which becomes settled in the actual roll angle of actual roll REITO of the aforementioned vehicles and these vehicles crosses the threshold level line which specifies the relation between roll REITO and a roll angle. When judged with a rollover generating the aforementioned rollover judging nullification means when the point which becomes settled with the actual longitudinal direction acceleration of actual roll REITO of the aforementioned vehicles and these vehicles crossed the aforementioned threshold level line which specifies the relation between roll REITO and longitudinal direction acceleration The control unit of occupant crash protection which is constituted and becomes so that this judgment may be repealed.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention judges generating of a collision of vehicles, or generating of the rollover (sideslip) of these vehicles, and relates to the control unit of the occupant crash protection which operates predetermined occupant crash protection.

[0002]

[Description of the Prior Art] When it judges with judging and carrying out the rollover of whether these vehicles carry out a rollover from the former based on the roll angle and roll rate of vehicles, the control unit of the occupant crash protection which operates occupant crash protection, such as an air bag and pulley tensioner, is known. On the other hand, in order that crew may approach the flank of vehicles with revolution of vehicles, when a rollover occurs during revolution, the expansion space of the air bag with which the flank of these vehicles was equipped is small, and there is a bird clapper. Then, while vehicles judge from a steering angle whether it is under [revolution] *****, are not circling [be / it], judging the generating existence of a rollover based on a roll angle and a roll rate and vehicles are circling, the equipment indicated by JP,2000-9599,A considers longitudinal direction acceleration further, and judges the generating existence of a rollover at an early stage.

[0003]

[Problem(s) to be Solved by the Invention] By the way, as for whether the rollover resulting from a wheel colliding with a curbstone etc., the rollover resulting from a steep turn of vehicles, etc. occur, it is advantageous to constitute so that longitudinal direction acceleration may judge [rather than a roll angle] from a bird clapper based on longitudinal direction acceleration and roll REITO greatly at an early stage. However, when it does in this way, it is at the collision time of vehicles, and when not resulting in a rollover, it judges with a rollover occurring and there is a problem of making unnecessary occupant crash protection operate. this invention is for coping with such a technical problem, and the purpose judges generating of a rollover certainly and is to offer the control unit of the occupant crash protection which can avoid the useless operation of occupant crash protection.

[0004]

[Summary of the Invention] One of the features of this invention for attaining this purpose A collision judging means to judge whether it was carried in the vehicles equipped with occupant crash protection, and the collision occurred on the aforementioned vehicles, A rollover judging means to judge whether a rollover occurs or not is included in the aforementioned vehicles. The control unit of the occupant crash protection which operates the aforementioned occupant crash protection when judged with the aforementioned rollover occurring at least After being judged with the aforementioned collision having occurred, it is in having had the rollover judging nullification means which repeals a judgment that the aforementioned rollover occurs between predetermined times. After performing this judgment, it is included in repealing a judgment that the rollover by the aforementioned rollover judging nullification means occurs repealing this judgment and that it is made not to perform [both] the said judging itself.

[0005] In this case, it is suitable to be constituted so that the aforementioned occupant crash protection consists of the 1st occupant crash protection and 2nd occupant crash protection, it operates the 1st occupant crash protection of the above when judged with the collision having occurred by the aforementioned collision judging means, and the 2nd occupant crash protection of the above may be operated, when judged with the aforementioned rollover occurring.

[0006] Here, it may be the side air bag which the 1st occupant crash protection is held in the sheet flank or door flank of vehicles when the gestalt of a collision is side **, and is developed, and the pulley tensioner which removes the slack of a seat belt, and the 2nd occupant crash protection may be a curtain air bag contained and developed by the roof side of vehicles. Moreover, for example, the 1st occupant crash protection may be a side air bag by the side of a side outbreak student, and a curtain air bag by the side of a side outbreak student, and the 2nd occupant crash protection may be the

curtain air bag of vehicles both sides. Or when the gestalt of a collision is the protrusion, the 1st occupant crash protection may be for example, a driver's seat air bag, a passenger seat air bag, and pulley tensioner, and the 2nd occupant crash protection may be a curtain air bag contained and developed by the roof side of vehicles.

[0007] Furthermore, it is suitable for the aforementioned collision judging means that it is in any of a side ***** means to judge whether side ** occurred on the aforementioned vehicles, a protrusion judging means to judge whether the protrusion occurred on the aforementioned vehicles, and a back ***** means to judge whether back ** occurred on the aforementioned vehicles.

[0008] When judged with collisions (side **, protrusion, back **, etc.) having occurred on vehicles according to this, it is supposed after that that a judgment that a rollover occurs is invalid between predetermined times. Therefore, in spite of not resulting in the predetermined time after a collision judging at a rollover, even if it is the case where it is judged with a rollover occurring, the occupant crash protection corresponding to this rollover does not operate superfluously.

[0009] Moreover, when judged with the collision having occurred as mentioned above, the 1st occupant crash protection corresponding to this collision is operated, and if it constitutes so that the 2nd occupant crash protection corresponding to this rollover may be operated when judged with a rollover occurring, only the suitable occupant crash protection according to each accident gestalt can be operated.

[0010] In this case, when the point which becomes settled with the actual longitudinal direction acceleration of actual roll REITO of vehicles and these vehicles crosses the threshold level line which specifies the relation between roll REITO and longitudinal direction acceleration, it is suitable for the aforementioned rollover judging means to be constituted so that it may judge with a rollover occurring.

[0011] In the case of the rollover (trip over) resulting from a wheel colliding with a curbstone etc., the rollover (turn over) resulting from a steep turn of vehicles, etc., longitudinal direction acceleration can judge generating of these rollovers at an early stage by larger composition of the above [bird clapper] to an early stage than a roll angle. Moreover, when judging generating of a rollover in this way, it becomes much more effective to cancel the judgment of generating of a rollover after the collision judging which is the above-mentioned feature. It is because a roll rate and longitudinal direction acceleration may have the same value as rollovers, such as the above-mentioned trip over, even if it is the case where it does not result immediately after a collision at a rollover.

[0012] Moreover, when the point which becomes settled with the actual longitudinal direction acceleration of roll REITO with the aforementioned vehicles actual in this case and these vehicles crosses the threshold-level line which specifies the relation between roll REITO and longitudinal direction acceleration, and becomes settled by the actual roll rate of these vehicles and the actual roll angle of these vehicles is in a rollover judging permitted region, it is suitable for the aforementioned rollover judging means to be constituted so that it may judge with the aforementioned rollover occurring.

[0013] When not judged with the collision having occurred, nullification of the rollover judging by the above-mentioned nullification means does not function. However, when the weak collision of impulse force it does not judge that is a collision occurs and it does not result in a rollover, roll REITO and longitudinal direction acceleration may cross the above-mentioned threshold level line. On the other hand, at the time of a rollover, a roll angle and roll REITO surely become large. Then, if it constitutes so that it may judge with a rollover occurring when the point that actual roll REITO and actual longitudinal direction acceleration cross a threshold level line, and moreover become settled by the actual roll rate and the actual roll angle as mentioned above is in a rollover judging permitted region, in spite of not resulting in a rollover, it may be avoided that the occupant crash protection for rollovers operates.

[0014] [in this case] moreover, the aforementioned rollover judging means It is constituted so that it may judge with a rollover occurring when the point which becomes settled in the actual roll angle of actual roll REITO of the aforementioned vehicles and these vehicles crosses the threshold level line which specifies the relation between roll REITO and a roll angle. When judged with a rollover generating the aforementioned rollover judging nullification means when the point which becomes settled with the actual longitudinal direction acceleration of actual roll REITO of the aforementioned vehicles and these vehicles crossed the aforementioned threshold level line which specifies the relation between roll REITO and longitudinal direction acceleration Being constituted so that this judgment may be repealed is suitable.

[0015] It is more advantageous for gestalten, such as fall over by the reason of the flip over by the reasons of the vehicles other than the above-mentioned trip over or a turn over running aground to an inclined plane and vehicles falling from the road shoulder, to exist in the gestalt of a rollover, and for a roll angle to judge the generating existence of a rollover with a roll angle and a roll rate from a bird clapper greatly at an early stage in [acceleration / longitudinal direction] this case. Moreover, since there is nothing with a bird clapper greatly [longitudinal direction acceleration] in flip over, fall over, etc., it is clearly distinguishable from the collision of side ** etc. Then, as for a rollover judging nullification means, it is desirable like the above-mentioned composition to be constituted so that only the judgment of

rollover generating by the roll rate and longitudinal direction acceleration may be repealed, without repealing the judgment of rollover generating by the roll angle and the roll rate. Consequently, it can operate occupant crash protection certainly required at the time of rollover generating, the above-mentioned control unit avoiding the operation of useless occupant crash protection.

[0016]

[Embodiments of the Invention] Hereafter, each operation gestalt of the control unit of the occupant crash protection by this invention is explained, referring to a drawing. The control unit of this occupant crash protection functions also as an air bag control unit and rollover judging equipment which judges a rollover.

[0017] (The 1st operation gestalt) As shown in drawing 1, the vehicles 10 carrying the control unit of this occupant crash protection are equipped with electric control equipment 20, the roll rate sensor 21, the longitudinal direction acceleration sensor 22, the ***** sensor 23, and the ***** sensor 24 while they are equipped with the right-hand side curtain air bag 11, the right-hand side side air bag 12, the left-hand side curtain air bag 13, and the left-hand side side air bag 14.

[0018] The right-hand side curtain air bag 11 is attached to the roof side rail of this body in each attachment section 11b, and at the time of expansion, the whole surface is worn mostly and, thereby, it prevents the thing of the right-hand side front window of vehicles, and a right-hand side rear window which crew's body moves to the method of the outside of vehicles while being attached to the front pillar of the body in attachment section 11a of the front end section, as shown in drawing 2.

[0019] As shown in drawing 3, the right-hand side side air bag 12 is held in the right-hand side section of the right-hand side front sheet (it sets to drawing 3 and is a driver's seat sheet) DS of vehicles, expands ahead [of this right-hand side front sheet DS / flank empty-vehicle both] at the time of expansion, and protects crew's right-hand side section.

[0020] Except for a fitting location, since the left-hand side curtain air bag 13 and the left-hand side side air bag 14 are the same as the right-hand side curtain air bag 11 and the right-hand side side air bag 12 respectively, they omit explanation. In addition, the 1st occupant crash protection by which carries out the right-hand side curtain air bag 11 and the right-hand side side air bag 12 at the time of a right-hand side side outbreak student (judgment), and the left-hand side curtain air bag 13 and the left-hand side side air bag 14 are developed, respectively at the time of a left-hand side side outbreak student (judgment) (operation) is constituted, and the right-hand side curtain air bag 11 and the left-hand side curtain air bag 13 constitute the 2nd occupant crash protection developed at the time of rollover generating (judgment) (operation).

[0021] Electric control equipment 20 is constituted as a microcomputer equipped with CPU20a, ROM20b and RAM20c, and input interface 20d, and output interface 20e etc., as shown in drawing 4 which is an outline block diagram. [which were mutually connected through the bus] CPU20a performs the program which was stored in ROM20b and which is mentioned later, using the temporary storage function of RAM20c.

[0022] The roll rate sensor (a roll REITO detection means, roll REITO acquisition means) 21, the longitudinal direction acceleration sensor (longitudinal direction acceleration detection means) 22, the ***** sensor 23, and the ***** sensor 24 are connected to input interface 20d of electric control equipment 20, and CPU20a inputs the detecting signal from these sensors into it. moreover, to output interface 20e of electric control equipment 20 Squibb (Squibb for right-hand side curtain air bags) 11c for developing the right-hand side curtain air bag 11, Squibb (Squibb for left-hand side curtain air bags) 13c for developing the left-hand side curtain air bag 13, Squibb (Squibb for right-hand side side air bags) 12a for developing the right-hand side side air bag 12, And Squibb (Squibb for left-hand side side air bags) 14a for developing the left-hand side side air bag 14 is connected, and CPU20a supplies a predetermined ignition signal (operation indication signal) to these.

[0023] The roll rate sensor 21 looks at from this vehicles front, the angular rate of rotation RR, i.e., roll REITO, of the circumference of the axis (rolling shaft) prolonged in the cross direction of these vehicles through the center of gravity of vehicles, and detects right-handed rotation as a positive value. The longitudinal direction acceleration sensor 22 detects the right of these vehicles for the acceleration GY of the right-and-left longitudinal direction of these vehicles caudad generated from the center of gravity of vehicles as a positive value.

[0024] Acceleration-sensor 23a which detects the longitudinal direction acceleration which the ***** sensor (front seat ***** sensor) 23 is attached in the lower part of a right-hand side center pillar (right-hand side B pillar), and is produced in this right-hand side center pillar, It has judgment circuit 23b which compares the said-detected longitudinal direction acceleration with a predetermined value. When this longitudinal direction acceleration becomes larger than a said place constant value, it has a value "1" (Hi level) (namely, when side ** on the right-hand side of a vehicles front seat is detected), and when this longitudinal direction acceleration is below the aforementioned predetermined value, the output signal RS which has a value "0" (Lo level) is generated. This ***** sensor 23 constitutes the side ***** means (therefore, collision judging means).

[0025] Similarly the ***** sensor (front seat ***** sensor) 24 Acceleration-sensor 24a which detects the longitudinal direction acceleration which it is attached in the lower part of a left-hand side center pillar (left-hand side B pillar), and is produced in this left-hand side center pillar, It has judgment circuit 24b which compares the said-detected longitudinal direction acceleration with a predetermined value. When this longitudinal direction acceleration becomes larger than a said place constant value, it has a value "1" (namely, when side ** on the left-hand side of a vehicles front seat is detected), and when this longitudinal direction acceleration is below a said place constant value, the output signal LS which has a value "0" is generated. This ***** sensor 24 as well as the ***** sensor 23 constitutes the side ***** means.

[0026] Next, if the operation of the control unit of the occupant crash protection constituted as mentioned above is explained, CPU20a will perform the program (rollover judging routine) shown in drawing 5 for every progress of a predetermined time from Step 500, and will read the longitudinal direction acceleration GY from the horizontal **** acceleration sensor 22 at Step 505. Subsequently, it computes roll angle RA by CPU20a reading roll REITO RR from the roll rate sensor 21 at Step 510, and carrying out the time quadrature of this roll REITO RR at Step 515.

[0027] Subsequently, it judges whether CPU20a progresses to Step 520 and a rollover generates it based on the rollover judging map of roll rate RR-roll angle RA shown in drawing 7, and the actual roll rate RR obtained at previous Step 510,515 and actual roll angle RA at this step 520. If it states concretely, CPU20a will judge whether the point (state of vehicles) which becomes settled by actual roll REITO RR and actual roll angle RA crossed the threshold level line L1 which specifies the relation between roll REITO RR and roll angle RA. And since it is thought that a rollover occurs when a judgment result is "Yes", CPU20a progresses to Step 525 from Step 520, sends out an ignition signal to Squibb 11c and 13c for curtain air bags of right-hand side and left-hand side (both sides), and develops both the curtain air bags 11 and 13. Then, CPU20a progresses to Step 595 and once ends this routine. Thus, Step 520 has attained a part of function of a rollover judging means.

[0028] When the point which becomes settled by actual roll REITO RR and actual roll angle RA at the time of the judgment of previous Step 520, on the other hand, is not crossing the threshold level line L1, The rollover judging map of the roll rate RR-longitudinal direction acceleration GY which CPU20a judged with "No" at Step 520, progressed to Step 530, and was shown in drawing 8 at this step 530, It judges whether a rollover occurs based on the actual roll rate RR obtained at previous Step 510,505, and the actual longitudinal direction acceleration GY. If it states concretely, CPU20a judges whether the point (state of vehicles) which becomes settled with actual roll REITO RR and the actual longitudinal direction acceleration GY crossed the threshold level line L2 which specifies the relation between roll REITO RR and the longitudinal direction acceleration GY, and when a judgment result is "Yes", it will progress to Step 535. On the other hand, when the judgment result in Step 530 is "No", CPU20a progresses to Step 595 as what a rollover does not generate, and once ends this routine at this step 595. In addition, Step 530 has attained a part of function of a rollover judging means.

[0029] CPU20a judges whether the point (state of vehicles) which becomes settled by actual roll REITO RR and actual roll angle RA at this step 535 is in the rollover judging permitted region of the judgment permission map (side ** guard map) of roll rate RR-roll angle RA shown in drawing 9, when it progresses to Step 535. This judgment permission map is a map which specifies the field which does not include a zero among the fields which divide the 2-dimensional field which consists of roll REITO RR and roll angle RA by the threshold level line Lk (and the X-axis and a Y-axis), and can do it as a rollover judging permitted region. It is the threshold level line Lk at the side ** time from which the output signal RS of the ***** sensor 23 or the output signal LS of the ***** sensor 24 does not serve as a value "1", and it is a boundary line which distinguishes the case where it does not generate with the case where a rollover occurs. CPU20a progresses to Step 540, when the judgment result in Step 535 is "Yes", and when this judgment result is "No", a rollover progresses to Step 595 as what is not generated, and once ends this routine.

[0030] CPU20a judges whether the value of the right-hand side side outbreak student flag FR is "0" at this step 540, when it progresses to Step 540. after judging with right-hand side side ** having occurred namely,, the value of this right-hand side side outbreak student flag FR is set to "1" after the output signal RS of the ***** sensor 23 serves as a value "1" so that it may mention later until a predetermined time T10 passes, and in the case of others, it is set to "0"

[0031] CPU20a progresses to Step 545, when the judgment result in Step 540 is "Yes", and it judges whether the value of the left-hand side side outbreak student flag floor line is "0" at this step 545. after judging with left-hand side side ** having occurred namely,, the value of this left-hand side side outbreak student flag floor line is set to "1" after the output signal LS of the ***** sensor 24 serves as a value "1" so that it may mention later until a predetermined time T20 passes, and in the case of others, it is set to "0"

[0032] And when the judgment result in Step 545 is "Yes", CPU20a progresses to Step 525, sends out an ignition signal to right-hand side and Squibb 11c and 13c for left-hand side curtain air bags, and develops both the curtain air bags 11 and 13. Then, CPU20a progresses to Step 595 and once ends this routine. On the other hand, when the judgment result

in Step 540 or Step 545 is "No", CPU20a progresses to Step 595 as what a rollover does not generate, and once ends this routine at this step 595. Thus, Step 540,545 has attained the function of the rollover judging nullification means which repeals the rollover judging based on the roll rate RR and the longitudinal direction acceleration GY.

[0033] As mentioned above, CPU20a develops the curtain air bags 11 and 13 of both sides, when it judges with "Yes" at Step 520 or judges with "Yes" at all the steps of Steps 530-545.

[0034] Next, it explains from the case where side ** has not occurred about the operation for side ***** including operation of the above-mentioned right-hand side side ** and the left-hand side side outbreak student flags FR and floor line. In addition, the value of the right-hand side side outbreak student flag FR and the left-hand side side outbreak student flag floor line is set as "0" by the initial routine which is not illustrated, when the ignition switch of the vehicles which are not illustrated is changed into "ON" from "OFF."

[0035] CPU20a performs processing of the program (side ***** routine) shown in drawing 6 for every progress of a predetermined time from Step 600, and judges whether the value of the output signal RS of the above-mentioned ***** sensor 23 changed from "0" to "1" at Step 605. Since ***** is not generated at present, CPU20a judges with "No" at Step 605, and it progresses to Step 610 and judges whether the value of the right-hand side side outbreak student flag FR is "1."

[0036] The right-hand side side outbreak student flag FR judges whether since it was set as "0" by the initial routine, CPU20a was judged at Step 610 to be "No", it progressed to Step 615, and the value of the output signal LS of the ***** sensor 24 changed from "0" to "1." Since ***** is not generated at present, either, CPU20a judges with "No" at Step 615, and it progresses to Step 620 and judges whether the value of the left-hand side side outbreak student flag floor line is "1." Since the left-hand side side outbreak student flag floor line is set as "0" by the initial routine, CPU20a judges it at Step 620 to be "No", it progresses to Step 695, and once ends this routine.

[0037] Thus, when side ** has not occurred, the value of the right-hand side side outbreak student flag FR and the left-hand side side outbreak student flag floor line is maintained by "0."

[0038] Next, if explanation is continued as what the collision generated on the right-hand side of vehicles in this state, the value of the output signal RS of the ***** sensor 23 will change to "1" from "0" in this case. Therefore, when it progresses to Step 605 to predetermined timing, CPU20a judges with "Yes" at this step 605, progresses to Step 625, and sets the value of the right-hand side side outbreak student flag FR as "1" at this step 625.

[0039] Subsequently, it sends out an ignition signal to Squibb 11c for right-hand side curtain air bags at Step 640 while CPU20a progresses to Step 630, sets the value of a timer T1 as "0" and sends out an ignition signal to Squibb 12a for right-hand side side air bags at continuing Step 635. Consequently, the right-hand side side air bag 12 and the right-hand side curtain air bag 11 by the side of side ** develop. Then, although CPU20a progresses to Step 615, the output value LS of the ***** sensor 24 is still "0" in this case. Therefore, CPU20a progresses with Step 620,695 and once ends this routine.

[0040] If predetermined time passes in this state, CPU20a will start processing of this routine from Step 600 again. In this case, since it is not immediately after the output value of the ***** sensor 23 changes to "1" from "0", CPU20a judges with "No" at Step 605, and progresses to Step 610. Since the value of the right-hand side side outbreak student flag FR is set as "1" at previous Step 625 at this time, CPU20a judges with "Yes" at Step 610, it progresses to Step 645, and only "1" increases the value of a timer T1. Subsequently, CPU20a judges whether the value of a timer T1 is larger than the predetermined value T10 at Step 650. After this predetermined value T10 is judged as side ** having occurred on the right-hand side of vehicles, it is set as time to be equivalent to the period which should make invalid a judgment (step 530 reference of drawing 5) that the rollover based on the roll rate RR and the longitudinal direction acceleration GY occurs.

[0041] In this case, since it is it and it is smaller than the predetermined value T10 immediately after setting the value of a timer T1 as "0" at previous Step 630, CPU20a judges with "No" at Step 650, and once ends this routine at Step 695 through Step 615,620 after that.

[0042] Henceforth, in order that CPU20a may repeat and perform Steps 600 and 605,610,645,650 for every progress of a predetermined time, the value of a timer T1 increases gradually by execution of Step 645, and if predetermined time passes, it will become larger than the predetermined value T10. For this reason, when it progresses to Step 650, it judges with "Yes" at this step 650, and CPU20a progresses to Step 655, returns the value of the right-hand side side outbreak student flag FR to "0" at this step 655, and once ends this routine at Step 695 through Step 615,620 after that.

[0043] As mentioned above, if a collision occurs on the right-hand side of vehicles, while the right-hand side side air bag 12 and the right-hand side curtain air bag 11 will be developed, the value of the right-hand side side outbreak student flag FR is set to "1" only for the time corresponding to a predetermined time T10.

[0044] Next, if it explains as what the collision generated previously on the left-hand side of vehicles, CPU20a will operate like the case where a collision occurs on the right-hand side of vehicles. That is, since the value of the output

signal LS of the ***** sensor 24 is changing to "1" from "0" in this case, when it progresses to Step 615 to predetermined timing, CPU20a judges with "Yes" at this step 615, progresses to Step 660, and sets the value of the left-hand side side outbreak student flag floor line as "1" at this step 660.

[0045] Subsequently, CPU20a progresses to Step 665, sets the value of a timer T2 as "0", and sends out an ignition signal to Squibb 14 for left-hand side side air bags a, and Squibb 13c for left-hand side curtain air bags at continuing Step 670,675, respectively. Consequently, the left-hand side side air bag 14 and the left-hand side curtain air bag 13 by the side of side ** develop. Then, CPU20a progresses to Step 695 and once ends this routine.

[0046] If predetermined time passes in this state, CPU20a will start processing of this routine from Step 600 again, it will progress to Step 680 via Step 605,610,615,620, and only "1" will increase the value of a timer T2 at this step 680. Subsequently, CPU20a progresses to Step 685 and judges whether the value of a timer T2 is larger than the predetermined value T20. After this predetermined value T20 is judged as side ** having occurred on the left-hand side of vehicles, it is set as time to be equivalent to the period which should make invalid a judgment (step 530 reference of drawing 5) that the rollover based on the roll rate RR and the longitudinal direction acceleration GY occurs. In addition, a value equal to the aforementioned predetermined value T10 is sufficient as the predetermined value T20, and a different value is sufficient as it.

[0047] In this case, since it is it and it is smaller than the predetermined value T20 immediately after setting the value of a timer T2 as "0" at previous Step 665, CPU20a judges with "No" at Step 685, and once ends this routine at Step 695. Henceforth, since this operation is repeated, the value of a timer T2 increases gradually by execution of Step 680, and if predetermined time passes, it will become larger than the predetermined value T20. For this reason, when it progresses to Step 685, it judges with "Yes" at this step 685, and CPU20a progresses to Step 690, returns the value of the left-hand side side outbreak student flag floor line to "0" at this step 690, and once ends this routine at Step 695 after that.

[0048] As mentioned above, if a collision occurs on the left-hand side of vehicles, while the left-hand side side air bag 14 and the left-hand side curtain air bag 13 will be developed, the value of the left-hand side side outbreak student flag floor line is set to "1" only for the time corresponding to a predetermined time T20.

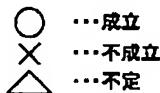
[0049] Drawing 10 shows the operation explained above by the logical circuit. Namely, when the rollover judging (conditions A) based on the rollover judging map, the actual roll rate RR, and actual roll angle RA of drawing 7 is materialized according to this operation gestalt, Or the rollover judging (conditions B) based on the rollover judging map, the actual roll rate RR, and the actual longitudinal direction acceleration GY of drawing 8 is materialized. And the rollover judging permissive conditions (conditions C) based on the judgment permission map, the actual roll rate RR, and actual roll angle RA of drawing 9 are satisfied. It is judged with a rollover occurring in {A or} (B and C and D and E), when materialized. and -- since there is a judgment of ***** -- the inside of a predetermined time -- not but (conditions D) -- and -- since there is a judgment of ***** -- the inside of a predetermined time -- it is not (conditions E) -- Both the curtain air bags 11 and 13 are developed. Moreover, when the output signal RS of the ***** sensor 23 is set to "1", the right-hand side curtain air bag 11 and the right-hand side side air bag 12 are developed, and when the output signal LS of the ***** sensor 24 is set to "1", the left-hand side curtain air bag 13 and the left-hand side side air bag 14 are developed. In addition, the circuit (it carries out nominal to a "hold circuit" hereafter.) indicated to be "a hold" in drawing 10 is a circuit where only a predetermined time (T10 or T20) maintains a value "1", when an input value changes to "1" from "0." Moreover, it is the circuit where the circuit indicated to be "NOT" changes an input value "1" into "0", and changes an input value "0" into "1", therefore Conditions D and Conditions E are satisfied when the reversal (negative) value of the output of a hold circuit is "1."

[0050] The following table 1 shows the result which examined formation and an abortive combination of each above-mentioned conditions. Since Conditions B become unfixed when side ** occurs and it does not generate a rollover so that clearly from this table 1, a misjudgment law is carried out to judging the generating existence of a rollover by the OR of Conditions A and Conditions B. on the other hand -- since the rollover judging based on Conditions B is repealed by Conditions D and E in the above-mentioned operation gestalt -- the aforementioned misjudgment -- a law is avoided

[0051]

[Table 1]

	RS 又は LS	ロールオーバ 発生	RR-RA判定 <条件A>	RR-GY判定 <条件B>	RR-RA 判定許容 <条件C>	右突フラグFR 又は 左突フラグFL <条件D,E>	本実施形態の ロールオーバ 判定	(従来) 条件A 又は 条件B
側突 なし	0	非発生	×	×	×	○	×	×
		発生	○	○	○	○	○	○
側突 あり	1	非発生	×	△	○	×	×	△
		発生	○	△	○	×	○	○
	0	非発生	×	△	×	○	×	△
		発生	○	○	○	○	○	○



[0052] Moreover, according to the experiment, although side ** occurred, the output signal RS of the ***** sensor 23 and the output signal LS of the ***** sensor 24 are "0", and Conditions B become unfixed when not generating a rollover. For this reason, a misjudgment law is carried out to judging the generating existence of a rollover by the OR of Conditions A and Conditions B. on the other hand -- since the rollover judging based on Conditions B is repealed by Conditions C in the above-mentioned operation gestalt -- the aforementioned misjudgment -- a law is avoided

[0053] In addition, when side ** occurs on the right-hand side of vehicles, the output signal RS of the ***** sensor 23 was set to "1" and a rollover occurs in side [this] ** while the right-hand side curtain air bag 11 was developed by this, Conditions A are satisfied and the left-hand side curtain air bag 13 is also developed. When similarly side ** occurs on the left-hand side of vehicles, the output value LS of the ***** sensor 24 was set to "1" and a rollover occurs in side [this] ** while the left-hand side curtain air bag 13 was developed by this, Conditions A are satisfied and the right-hand side curtain air bag 11 is also developed.

[0054] Next, the modification of the above-mentioned 1st operation gestalt is explained. In addition to the composition of the above-mentioned 1st operation gestalt, the control unit of the occupant crash protection concerning this modification is equipped with the backseat ***** sensor 25 and the backseat ***** sensor 26 as shown in drawing 11. The backseat ***** sensor 25 and the backseat ***** sensor 26 are connected to input interface 20d as shown in drawing 12.

[0055] Acceleration-sensor 25a which detects the longitudinal direction acceleration which the backseat ***** sensor 25 is attached near the right-hand side rear pillar (right-hand side C pillar), and is produced in this right-hand side rear pillar, It has judgment circuit 25b which compares the said-detected longitudinal direction acceleration with a predetermined value. When this longitudinal direction acceleration becomes larger than a said place constant value, it has a value "1" (Hi level) (namely, when side ** on the right-hand side of a vehicles backseat is detected), and when longitudinal direction acceleration is below the aforementioned predetermined value, the output signal RRS which has a value "0" (Lo level) is generated. This backseat ***** sensor 25 also constitutes the side ***** means.

[0056] Acceleration-sensor 26a which similarly detects the longitudinal direction acceleration which the backseat ***** sensor 26 is attached near the left-hand side rear pillar (left-hand side C pillar), and is produced in this left-hand side rear pillar, It has judgment circuit 26b which compares the said-detected longitudinal direction acceleration with a predetermined value. When this longitudinal direction acceleration becomes larger than a said place constant value, it has a value "1" (Hi level) (namely, when side ** on the left-hand side of a vehicles backseat is detected), and when this longitudinal direction acceleration is below the aforementioned predetermined value, the output signal RLS which has a value "0" (Lo level) is generated. This backseat ***** sensor 26 also constitutes the side ***** means.

[0057] Next, if it explains referring to the logical circuit view shown in drawing 13 about the operation of the modification constituted as mentioned above While this modification performs a rollover judging like the above-mentioned 1st operation gestalt and develops the curtain air bags 11 and 13 of both sides The front seat ***** sensor 23 and the front seat ***** sensor 24 perform side ***** , and any of the side air bags 12 and 14 any of the curtain air bags 11 and 13 by the side of a side outbreak student and by the side of a side outbreak student are developed.

[0058] However, the predetermined time after the output value RS of the ***** sensor 23 changes from "0" to "1" in a modification, And the predetermined time after the output value LS of the ***** sensor 24 changes to "1" from "0" It

adds to repealing the rollover judging (conditions B) based on the actual roll rate RR and the actual longitudinal direction acceleration GY. While Conditions F fall through ("0") and repeal the rollover judging based on the actual roll rate RR and the actual longitudinal direction acceleration GY, the predetermined time after the output value RRS of the backseat ***** sensor 25 changes to "1" from "0" Conditions G fall through ("0") and the predetermined time after the output value RLS of the backseat ***** sensor 26 changes to "1" from "0" repeals the rollover judging based on the actual roll rate RR and the actual longitudinal direction acceleration GY.

[0059] Moreover, in a modification, when the output value RRS of the backseat ***** sensor 25 changes from "0" to "1", the right-hand side curtain air bag 11 is developed, and when the output value RLS of the backseat ***** sensor 26 changes from "0" to "1", the left-hand side curtain air bag 13 is developed. By the above, while the curtain air bag by the side of side ** is developed to suitable timing to side ** by the side of a backseat, the judgment of the rollover based on side [this] ** can be repealed, and expansion of a useless curtain air bag can be avoided.

[0060] As mentioned above, since only a predetermined time repeals the judgment of the rollover based on the roll rate RR and the longitudinal direction acceleration GY after that when it judges with side ** having occurred based on the longitudinal direction acceleration produced in a center pillar (they are a center pillar or a rear pillar according to the modification) according to the 1st operation gestalt by this invention, as explained, the operation of useless occupant crash protection (curtain air bag which is not a side ** side) may be avoided. Moreover, if there is no point which becomes settled in the roll rate RR and roll angle RA further in a rollover judging permitted region even when judged with a rollover occurring with the roll rate RR and the longitudinal direction acceleration GY by the case where it is not judged with side ** having occurred, since this rollover judging will be repealed, the operation of useless occupant crash protection may be avoided.

[0061] (The 2nd operation gestalt) Next, the 2nd operation gestalt by this invention is explained. When a collision (henceforth the "protrusion") occurs ahead [vehicles], when a collision (henceforth "after **") occurs in vehicles back, and not only when side ** generates this 2nd operation gestalt, but when, after that, only a predetermined time repeals the judgment of the rollover based on the roll rate RR and the longitudinal direction acceleration GY, and the operation of useless occupant crash protection (curtain air bag) is avoided.

[0062] If it explains concretely with reference to a drawing, as shown in drawing 14, vehicles 10 are equipped with electric control equipment 20, the roll rate sensor 21, the longitudinal direction acceleration sensor 22, the ***** sensor 23, the ***** sensor 24, the backseat ***** sensor 25, and the backseat ***** sensor 26 while they are equipped with the right-hand side curtain air bag 11, the right-hand side side air bag 12, the left-hand side curtain air bag 13, and the left-hand side side air bag 14. This composition is the same as that of the vehicles 10 of the above-mentioned 1st operation gestalt and its modification, and since each detail is as having mentioned above, the explanation is omitted here.

[0063] Vehicles 10 are further equipped with the front seat right (driver's seat) pulley tensioner 15, the front seat left (passenger seat) pulley tensioner 16, the backseat right pulley tensioner 17, the backseat left pulley tensioner 18, the driver's seat protrusion air bag 19-1, the passenger seat protrusion air bag 19-2, the floor G sensor 27, the right front satellite sensor 28, and the left front satellite sensor 29.

[0064] The front seat right (driver's seat) pulley tensioner 15, the front seat left (passenger seat) pulley tensioner 16, the backseat right pulley tensioner 17, and the backseat left pulley tensioner 18 remove the slack of the front seat right seat belt which omitted illustration, a front seat left seat belt, a back right seat seat belt, and a back left seat seat belt in a short time, respectively, when the predetermined conditions mentioned later are satisfied.

[0065] The driver's seat protrusion air bag 19-1 is a well-known thing, it is held in the center section of the steering wheel, expands to said steering wheel center-section empty-vehicle both back at the time of expansion, and protects an operator's thorax etc. The passenger seat protrusion air bag 19-2 is a well-known thing, it is held in the dash panel ahead of a passenger seat, expands to dash panel empty-vehicle both these back at the time of expansion, and protects the thorax of the crew of a passenger seat etc.

[0066] As shown in drawing 14, it is fixed to the floor tunnel of the abbreviation center section of vehicles, and electric control equipment 20 is constituted as a microcomputer equipped with CPU20a, ROM20b and RAM20c, and input interface 20d, and output interface 20e etc., as shown in drawing 15 which is an outline block diagram. [which were mutually connected through the bus]

[0067] The roll rate sensor 21, the longitudinal direction acceleration sensor 22, the ***** sensor 23, the ***** sensor 24, the backseat ***** sensor 25, and the backseat ***** sensor 26 are connected to input interface 20d of electric control equipment 20, and CPU20a inputs the detecting signal from these sensors into it. Moreover, Squibb 11for right-hand side curtain air bags c, Squibb 13for left-hand side curtain air bags c, Squibb 12for right-hand side side air bags a, and Squibb 14a for left-hand side side air bags are connected to output interface 20e of electric control equipment 20, and CPU20a supplies a predetermined ignition signal (operation indication signal) to it to these. Since

these composition is the same as that of the 1st operation gestalt and its modification, detailed explanation is omitted. [0068] Further, the floor G sensor 27, the right front satellite sensor 28, and the left front satellite sensor 29 are connected to input interface 20d of electric control equipment 20, and CPU20a inputs the detecting signal from these sensors into it.

[0069] moreover, to output interface 20e of electric control equipment 20 Furthermore, Squibb 15 for front seat right pulley tensioner a for removing the slack of a front seat right seat belt, Squibb 16 for front seat left pulley tensioner a for removing the slack of a front seat left seat belt, Squibb 17 for backseat right pulley tensioner a for removing the slack of a backseat right seat belt, Squibb 18 for backseat left pulley tensioner a for removing the slack of a backseat left seat belt, Squibb (Squibb for driver's seat protrusion air bags) 19-1a for developing the driver's seat protrusion air bag 19-1, And Squibb (Squibb for passenger seat protrusion air bags) 19-2a for developing the passenger seat protrusion air bag 19-2 is connected, and CPU20a supplies a predetermined ignition signal (operation indication signal) to these.

[0070] The floor G sensor 27 is held in electric control equipment 20, and the front of these vehicles is detected for the acceleration GX of the cross direction of these vehicles produced to the floor tunnel of the center of vehicles as a positive value.

[0071] Acceleration-sensor 28a which detects the front of these vehicles for the acceleration which the right front satellite sensor 28 is a side member on the right-hand side of vehicles, is attached in the position near the foremost part of these vehicles, and is produced to this installation part as a positive value, It has judgment circuit 28b which compares the said-detected acceleration with a predetermined value, when this acceleration becomes large from a said place constant value, it has a value "1" (Hi level), and when this acceleration is below the aforementioned predetermined value, the output signal FRS which has a value "0" (Lo level) is generated.

[0072] Similarly the left front satellite sensor 29 Acceleration-sensor 29a which detects the front of these vehicles for the acceleration which it is a side member on the left-hand side of vehicles, is attached in the position near the foremost part of these vehicles, and is produced to this installation part as a positive value, It has judgment circuit 29b which compares the said-detected acceleration with a predetermined value, when this acceleration becomes large from a said place constant value, it has a value "1" (Hi level), and when this acceleration is below the aforementioned predetermined value, the output signal FLS which has a value "0" (Lo level) is generated.

[0073] Next, the operation of the control unit of the occupant crash protection constituted as mentioned above is explained focusing on difference with the control unit concerning the 1st operation form. In addition, the following operations are attained by performing the program which CPU20a of electric control equipment 20 does not illustrate.

[0074] (Protrusion judging) CPU20a is detected by performing the logic judging which showed vehicles whether the protrusion occurred or not at drawing 16 for every progress of a predetermined time. That is, CPU20a judges whether the time-quadrature value SGX (it carries out nominal to "the integration value SGX of Floor G" hereafter.) from the point in time of the past in front of the predetermined time of the acceleration GX of the present floor which is in the state of the present vehicles, and the acceleration GX of this floor to this time is in Hi field of drawing 17 with block B1. The map (table) shown in drawing 17 is beforehand memorized in ROM20b, and classifies into Hi field, Lo field, and an OFF field the two-dimensional field which consists of acceleration GX of a floor, and an integration value SGX of Floor G. Simultaneously, it judges whether CPU20a has the acceleration GX of a floor, and the integration value SGX of Floor G in Lo field of drawing 17 in block B-2.

[0075] Moreover, it is acting as the monitor of whether from the right front satellite sensor 28 and the left front satellite sensor 29, had inputted the above-mentioned signal FRS and Signal FLS, respectively, and which these signals outputted the value "1", as for CPU20a (see the blocks B3 and B4).

[0076] And CPU20a judges with what the protrusion generated, when the acceleration GX of the present floor and the integration value SGX of Floor G are in Hi field of drawing 17, or when the acceleration GX of the floor of (1) (2) present and the integration value SGX of Floor G are in Lo field of drawing 17 and any of the above-mentioned signal FRS and Signal FLS they are outputs a value "1." Thus, CPU20a is performing the logic judging shown in drawing 16, and has attained the function of a protrusion judging means (therefore, collision judging means).

[0077] (Back *****) CPU20a is judged based on whether back ** occurred and whether the one following was materialized on vehicles for every progress of a predetermined time. That is, CPU20a carries out the time quadrature of the acceleration (acceleration of a floor) GX which a floor G sensor detects from the time t1 of the past in front of a predetermined time to [from this time] this time t2, and when the integration value is smaller than the negative threshold Kth, it judges with back ** having occurred on vehicles. Thus, CPU20a is performing the judgment shown in the one following, and has attained the function of a back ***** means (therefore, collision judging means).

[0078]

[Equation 1]

integralGX dt < Kth < 0 (the limits of integration are t1-t2)

[0079] (Operation control of occupant crash protection based on a collision and a rollover judging) Next, it explains, referring to drawing 18 which is a logical circuit view about the operation of occupant crash protection based on the collision judging which CPU20a performs, or a rollover judging. The judgment based on this logical circuit is attained by performing the program which CPU20a does not illustrate for every progress of a predetermined time. In addition, the aforementioned predetermined time to which the hold circuit of drawing 18 attains the operation to which only a predetermined time holds a value "1" when an input value changes to "1" from "0", and each hold circuit holds a value "1" may be the same, and may be time to differ mutually. Moreover, NOT circuit NOT connected to each hold circuit attains the operation which outputs "1" for "0" at the time of "0", when an input value is "1."

[0080] First, CPU20a has judged whether each conditions of Conditions A - Conditions I were satisfied for every progress of a predetermined time. Among these, since Conditions A - Conditions G are as having explained in the 1st operation gestalt and its modification, they omit detailed explanation. Conditions H are conditions from which only the predetermined time after being judged with the protrusion having occurred by the protrusion judging mentioned above becomes abortive. Conditions G are conditions from which only the predetermined time after being judged with back ** having occurred by ***** after mentioning above becomes abortive similarly.

[0081] It follows abortively and CPU20a operates formation of such conditions, and corresponding occupant crash protection (starting). When are stated concretely and the rollover judging based on the rollover judging map, the actual roll rate RR, and actual roll angle RA of drawing 7 is materialized when Conditions A are satisfied namely, CPU20a sends out an ignition signal to Squibb 11 for right-hand side curtain air bags c, and Squibb 13c for left-hand side curtain air bags so that both the curtain air bag of the right-hand side curtain air bag 11 and the left-hand side curtain air bag 13 may be developed. Moreover, if the above-mentioned conditions A are satisfied, CPU20a sends out an ignition signal to Squibb 15 for front seat right pulley tensioner a, Squibb 16 for front seat left pulley tensioner a, Squibb 17 for backseat right pulley tensioner a, and Squibb 18a for backseat left pulley tensioner so that all pulley tensioner (the front seat right pulley tensioner 15, the front seat left pulley tensioner 16, the backseat right pulley tensioner 17, and backseat left pulley tensioner 18) may be operated.

[0082] Moreover, CPU20a sends out an ignition signal to right-hand side, Squibb 11c and 13c for left-hand side curtain air bags, and each corresponding Squibb 15a-18a for pulley tensioner so that all the pulley tensioner 15-18 may be operated while developing both the curtain air bags 11 and 13, when all the conditions of Conditions B - Conditions I are satisfied.

[0083] Namely, the rollover judging (conditions B) based on the rollover judging map, the actual roll rate RR, and the actual longitudinal direction acceleration GY of drawing 8 is materialized. And the rollover judging permissive conditions (conditions C) based on the judgment permission map, the actual roll rate RR, and actual roll angle RA of drawing 9 are satisfied. and -- since there is a judgment of ***** -- the inside of a predetermined time -- not but (conditions D) -- and -- since there is a judgment of ***** -- the inside of a predetermined time -- not but (conditions E) And after there is side ***** to the backseat right, it is not in a predetermined time (conditions F). And after there is side ***** to the backseat left, it is not in a predetermined time (conditions G). And after there is back *****, when it is not in a predetermined time after there is a protrusion judging (conditions H), and it is not in a predetermined time (conditions I), while judging with a rollover occurring and developing both the curtain air bags 11 and 13, all the pulley tensioner 15-18 is operated. Thus, the function of the judgment of Conditions D - Conditions I and the AND circuit of drawing 18 constitutes a rollover judging nullification means to cancel the rollover judging by the rollover generating means (Conditions B or Conditions B, and Conditions C).

[0084] Moreover, CPU20a develops the right-hand side curtain air bag 11 and the right-hand side side air bag 12, when the output signal RS of the ***** sensor 23 is set to "1", and when the output signal LS of the ***** sensor 24 is set to "1", it develops the left-hand side curtain air bag 13 and the left-hand side side air bag 14. Furthermore, CPU20a develops the right-hand side curtain air bag 14, when the output signal RRS of the backseat ***** sensor 25 is set to "1", and when the output signal RLS of the backseat ***** sensor 26 is set to "1", it develops the left-hand side curtain air bag 13. In addition, when the output signal RRS of the backseat ***** sensor 25 is set to "1", the right-hand side side air bag 12 is developed, and when the output signal RLS of the backseat ***** sensor 26 is set to "1", you may constitute so that the left-hand side side air bag 14 may be developed. Moreover, when which signal of the output signal RS of the ***** sensor 23, the output signal LS of the ***** sensor 24, the output signal RRS of the backseat ***** sensor 25, and the output signal RLS of the backseat ***** sensor 26 is set to "1", you may constitute so that all the pulley tensioner 15-18 may be operated.

[0085] In addition, when it judges with CPU20a having had generating of the protrusion, while developing the driver's seat protrusion air bag 19-1 and the passenger seat protrusion air bag 19-2, all the pulley tensioner 15-18 is operated. In addition, when it judges with there having been generating of back **, you may constitute so that all the pulley tensioner 15-18 may be operated.

[0086] As mentioned above, since only a predetermined time repeats the judgment of the rollover based on the roll rate RR and the longitudinal direction acceleration GY after that when not only when side ** occurs, but the protrusion and back ** occur according to the 2nd operation gestalt (i.e., when a collision occurs on vehicles), as explained, the operation of useless occupant crash protection (curtain air bag) is avoidable.

[0087] In addition, this invention is not limited to each above-mentioned operation gestalt, and can adopt various modifications within the limits of this invention. For example, when the value of the outputs RS and LS of the ***** sensor 23 or the ***** sensor 24 changes to "1" from "0", you may operate the pulley tensioner with which a vehicles sheet is equipped and which decreases the slack of a seat belt in an instant. Moreover, in the above-mentioned operation gestalt, although both the curtain air bags 11 and 13 of both sides were developed when it judged with the rollover having occurred, you may constitute so that only the curtain air bag of the side (sideslipping side) which carries out a rollover may be developed. Moreover, the judgment method of collisions, such as the judgment method of a rollover, side **, protrusion, and back **, is not limited to the above-mentioned operation gestalt.

[0088] Furthermore, a protrusion judging is seasoned with the parameter of the speed (vehicle speed) of vehicles in the above-mentioned 2nd operation gestalt. (1) Even if there is a protrusion judging, when the vehicle speed is the 1st less than vehicle speed, any occupant crash protection is not operated. (2) a protrusion judging is made, and less than in the case of the 2nd vehicle speed more than at the 1st vehicle speed with the larger vehicle speed than this 1st vehicle speed, (when the 1st vehicle speed - the 2nd vehicle speed, and the 1st protrusion judging are materialized) Only the pulley tensioner 15-18 is operated and (3) protrusion judging is made, and when the vehicle speed is the 2nd more than vehicle speed, you may operate the pulley tensioner 15-18, the driver's seat protrusion air bag 19-1, and the passenger seat protrusion air bag 19-2 (when the 2nd protrusion judging is materialized). In this case, the protrusion judging explained by drawing 18 can be made into either the above-mentioned 1st protrusion judging or the above-mentioned 2nd protrusion judging.

[0089] In the above-mentioned 2nd operation gestalt each of the driver's seat protrusion air bag 19-1 and the passenger seat protrusion air bag 19-2 Moreover, the inflator of the 1st step and the 2nd step (plurality), When it is the multi-stage air bag equipped with Squibb corresponding to each inflator, (1) Even if there is a protrusion judging, when the vehicle speed is the 1st less than vehicle speed, any occupant crash protection is not operated. (2) a protrusion judging is made, and less than in the case of the 2nd vehicle speed more than at the 1st vehicle speed with the larger vehicle speed than this 1st vehicle speed, (when the 1st vehicle speed - the 2nd vehicle speed, and the 1st protrusion judging are materialized) He operates only the pulley tensioner 15-18, and (3) protrusion judging should do. The vehicle speed is the 2nd more than vehicle speed. and less than in the case of the 3rd larger vehicle speed than this 2nd vehicle speed, (when the 2nd vehicle speed - the 3rd vehicle speed, and the 2nd protrusion judging are materialized) While operating the pulley tensioner 15-18, the driver's seat protrusion air bag 19-1 and the passenger seat protrusion air bag 19-2 are operated by the inflator of the 1st step so that it may expand comparatively quietly. furthermore, (4) protrusion judging is made, and when the vehicle speed is the 3rd more than vehicle speed, (when the 3rd protrusion judging is materialized) While operating the pulley tensioner 15-18, you may constitute so that the expansion operation of the driver's seat protrusion air bag 19-1 and the passenger seat protrusion air bag 19-2 may be quickly carried out by the inflator of the 1st step and the 2nd step. And the protrusion judging explained by drawing 18 in this case can be made into either the above-mentioned 1st protrusion judging, the above-mentioned 2nd protrusion judging and the above-mentioned 3rd protrusion judging.

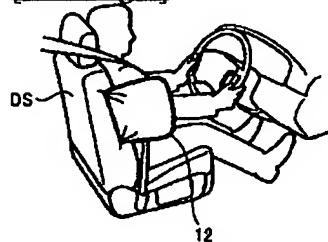
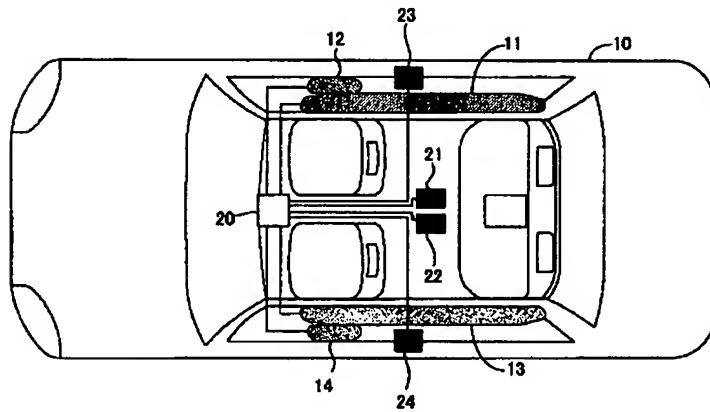
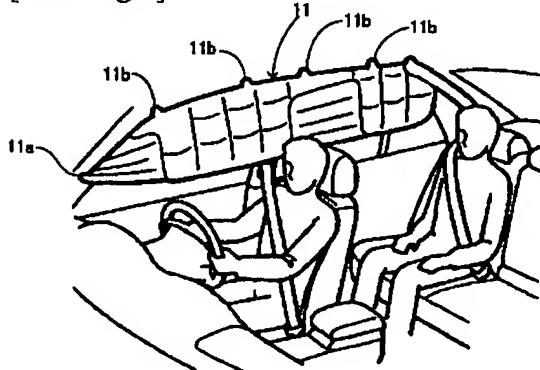
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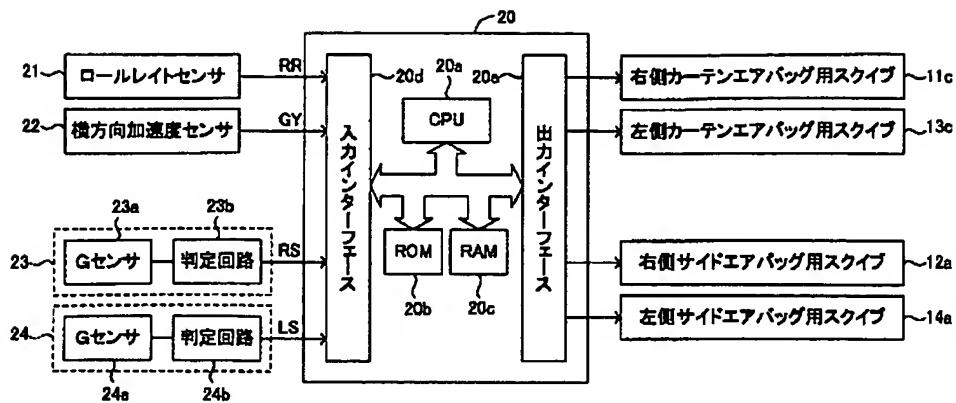
*** NOTICES ***

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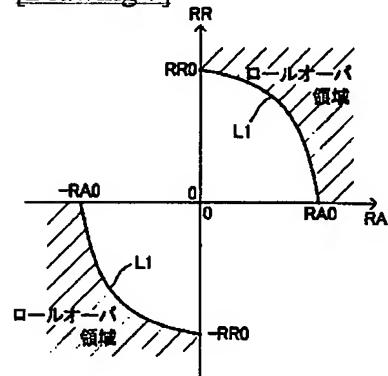
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. *** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

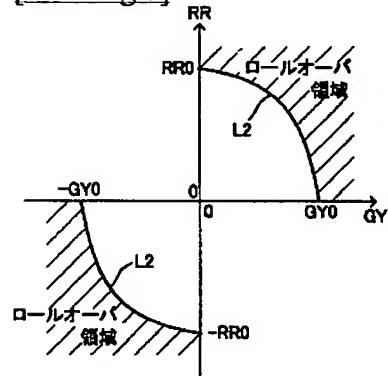
[Drawing 3]**[Drawing 1]****[Drawing 2]****[Drawing 4]**



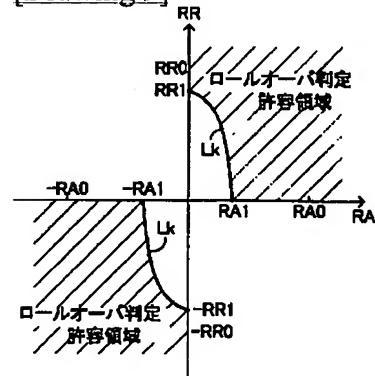
[Drawing 7]



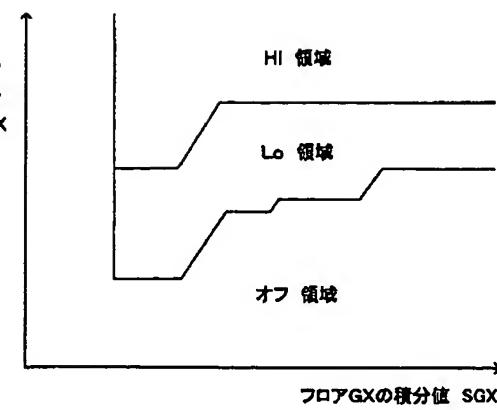
[Drawing 8]



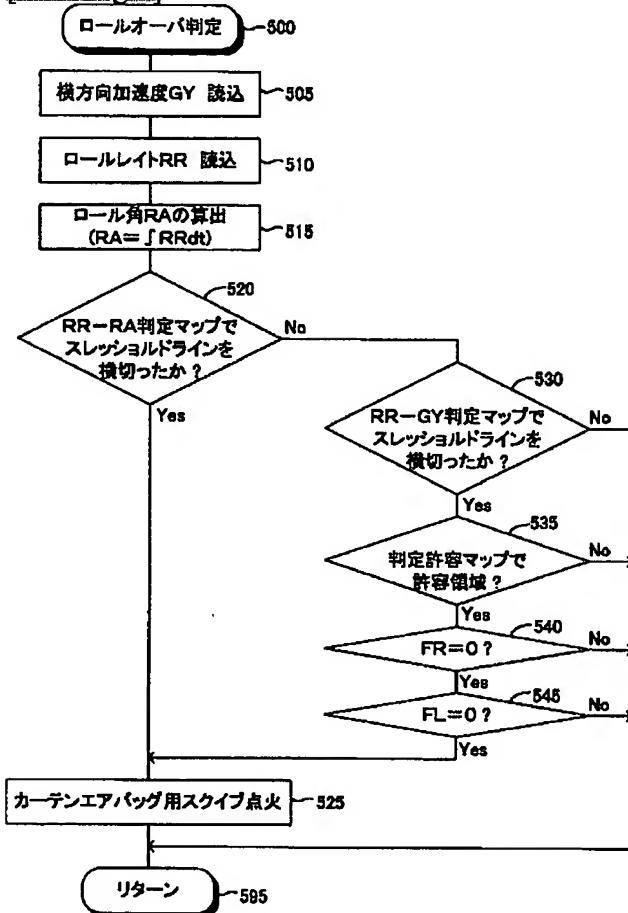
[Drawing 9]



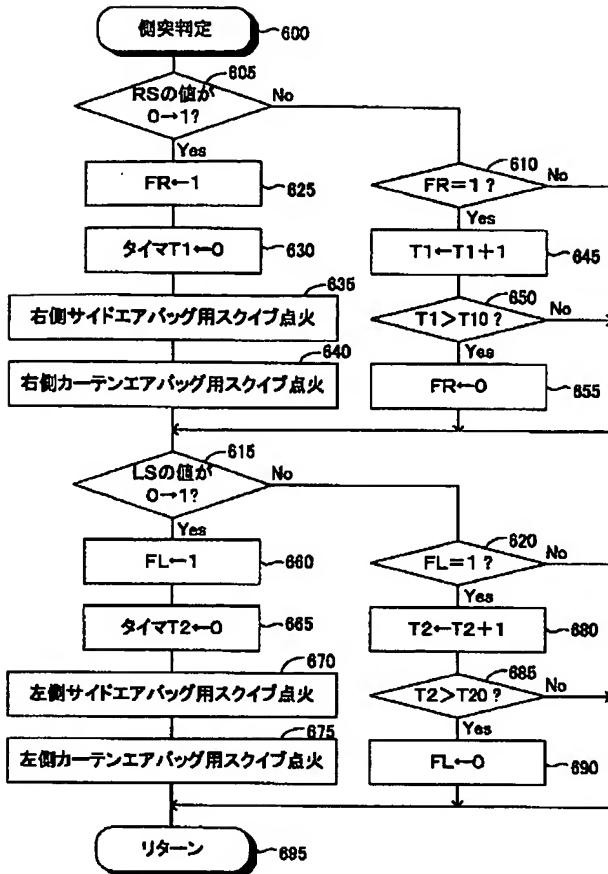
[Drawing 17]



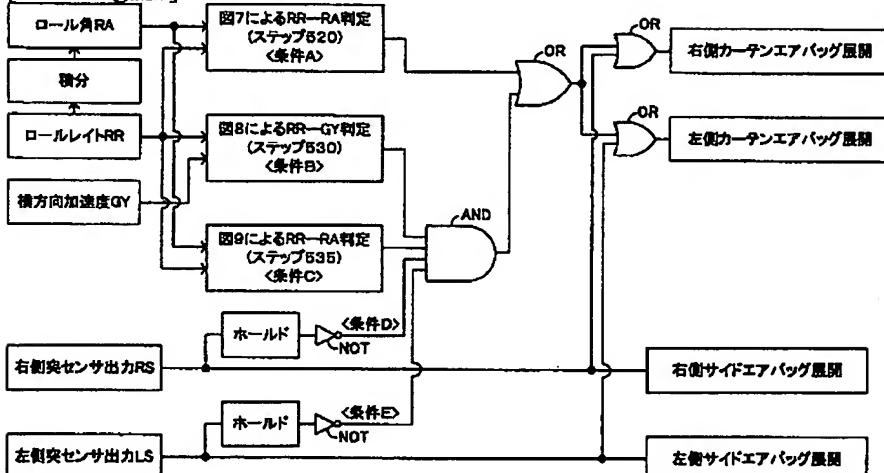
[Drawing 5]



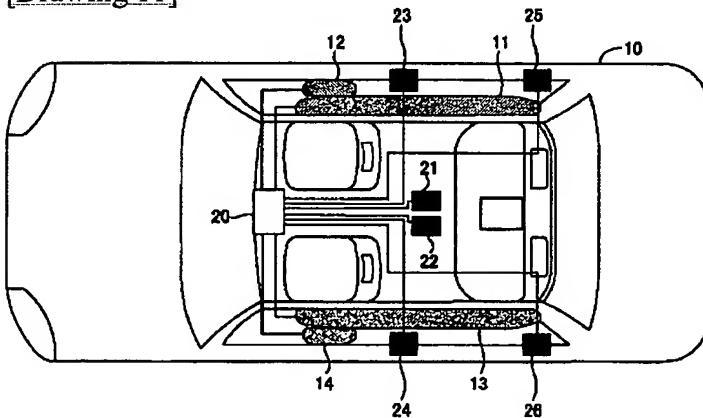
[Drawing 6]



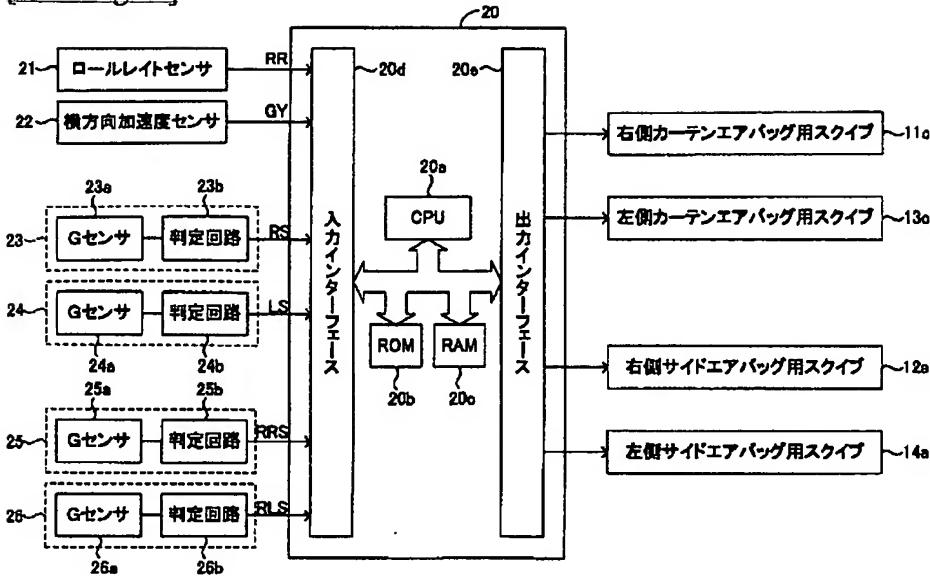
[Drawing 10]



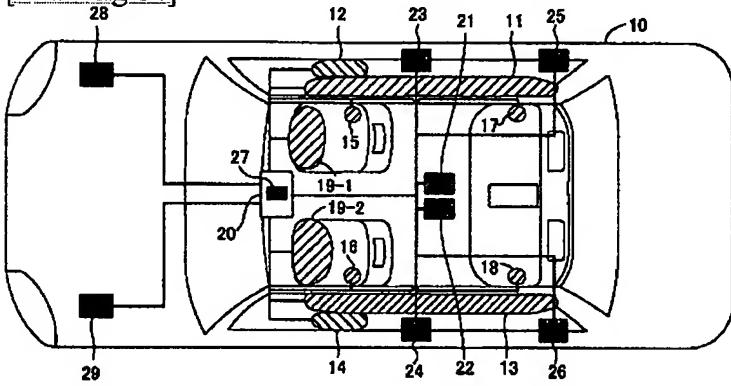
[Drawing 11]



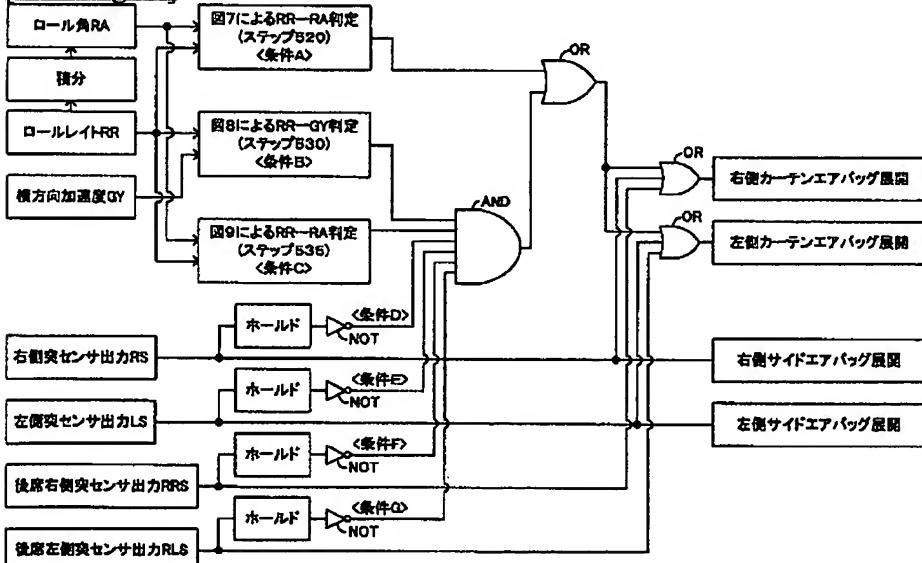
[Drawing 12]



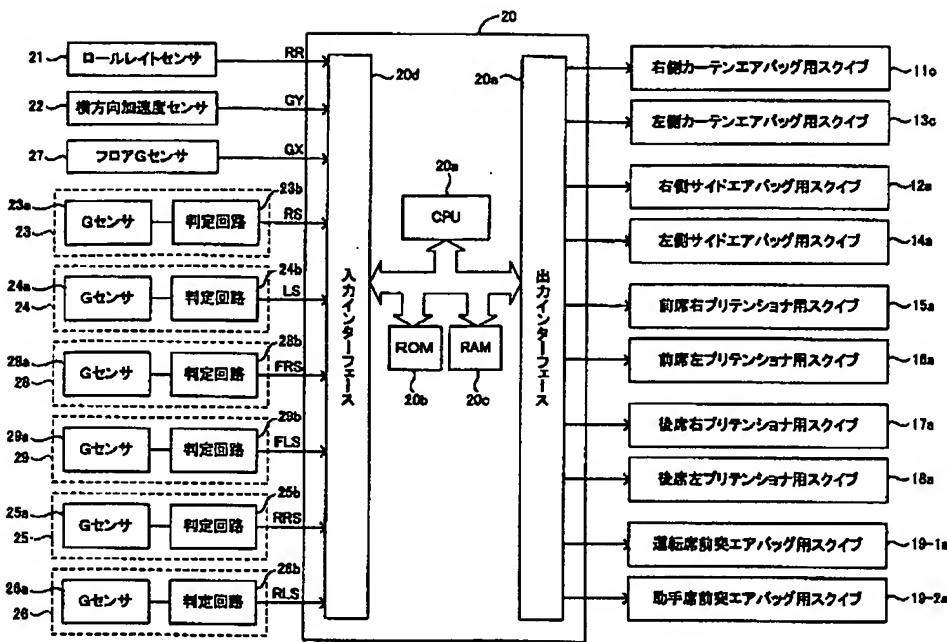
[Drawing 14]



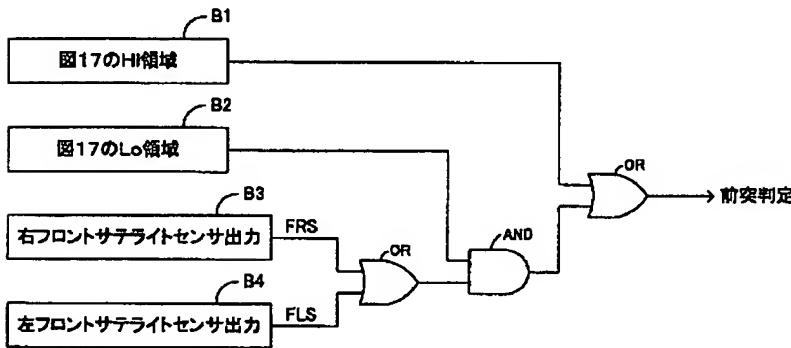
[Drawing 13]



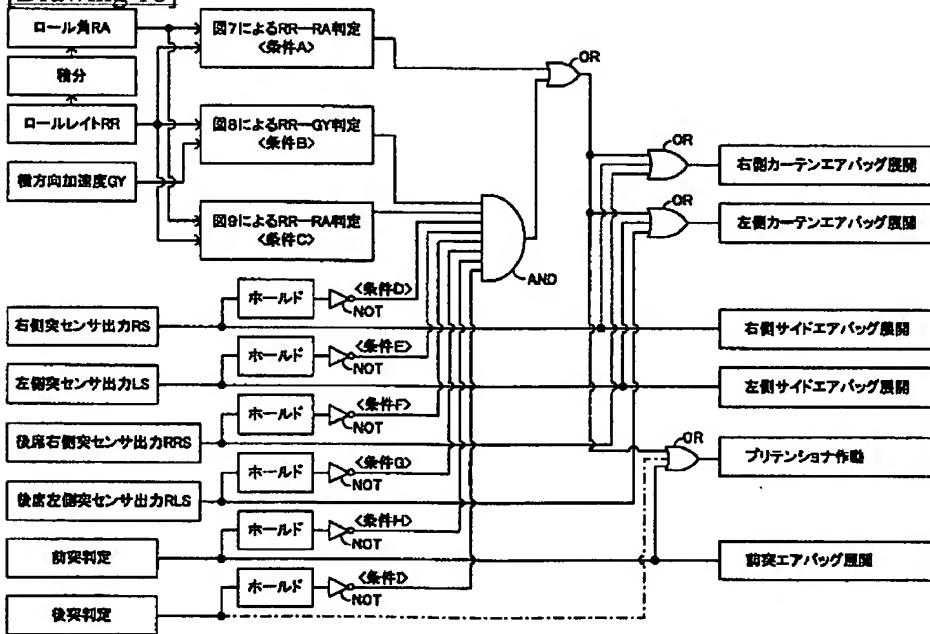
[Drawing 15]



[Drawing 16]



[Drawing 18]



[Translation done.]